

3.4 Panel 7: Integrated Resource Planning

3.4.1 Panel Chair:

David Moskowitz – Regulatory Assistance Project

Presentation charts follow





THE HAWAII WINDPOWER WORKSHOP



Integrated Resource
Planning

David Moskovitz

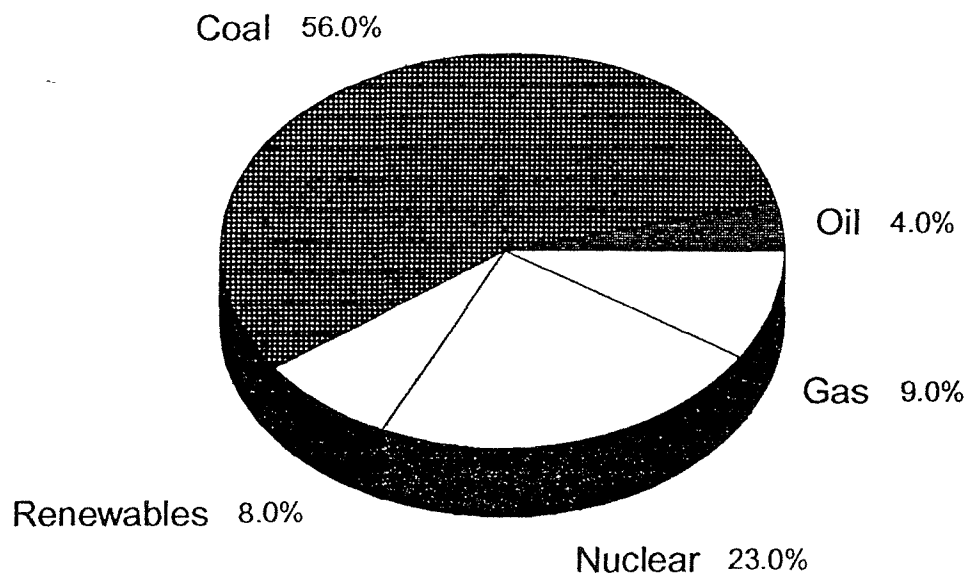
The Regulatory Assistance Project

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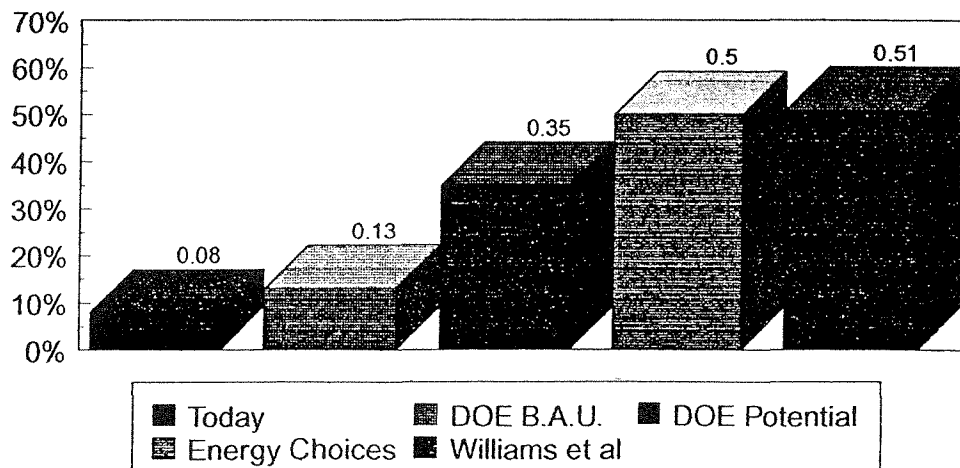
U.S. Electricity Generation



Possible Scenarios

Renewable Energy By 2030

Fraction of Primary Energy

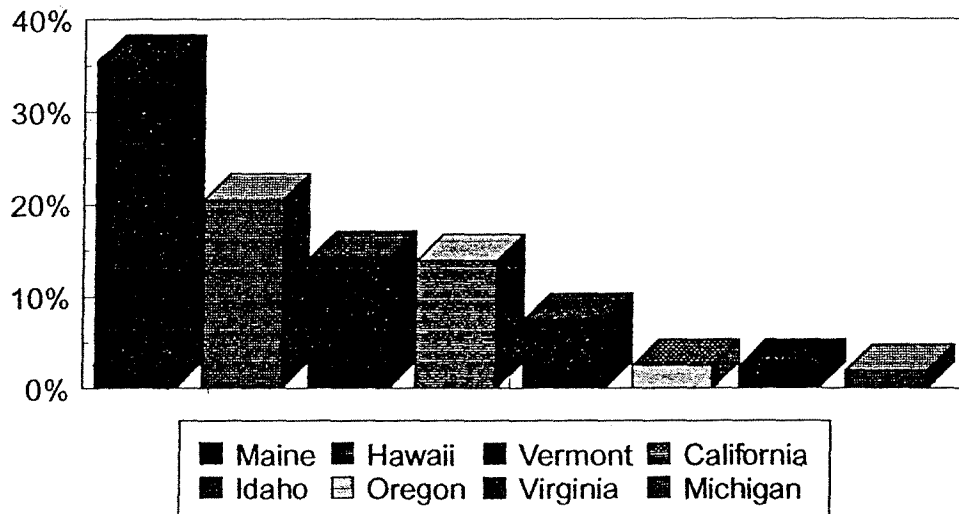


Williams et al is for 2025

State Status

% of Renewable Capacity

Grid-connected Only, Excluding Public & Utility Hydro



Source: Energy Info. Adm./Elec. Power Annual 1/92

Renewables

- ▶ Cost have come down
- ▶ Performance and reliability are up
- ▶ Renewables are very diverse so IR is a must





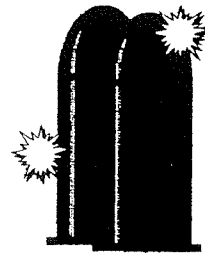
IRP Framework

- ▶ LCP tells you what a resource is worth
 - The more competition increases the options and lowers prices
- ▶ The more diverse the resources (and renewables are very diverse)
 - The more you need LCP
 - The more sophisticated the tools must be



No Magic Bullets

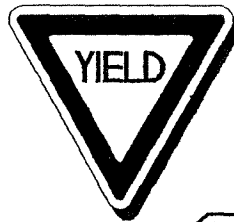
- ▶ There are barriers to be removed
 - Planning
 - Acquisition
 - Regulation
- ▶ There are policies and program initiatives to be pursued





Planning Barriers

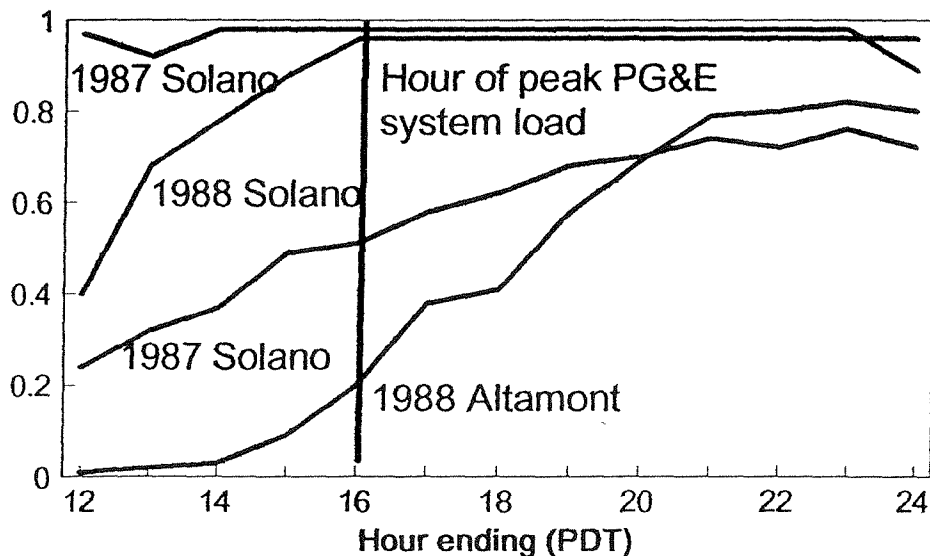
- Resource specific avoided cost
 - Dispatch
 - Intermittent
 - "Need"
- Distributed value
- Reliability
- *Risk/uncertainty*
- *Externalities*



Wind Plant Output

During PG&E Peak Load Days

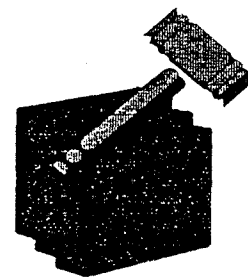
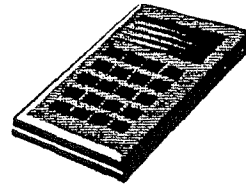
Output/maximum output



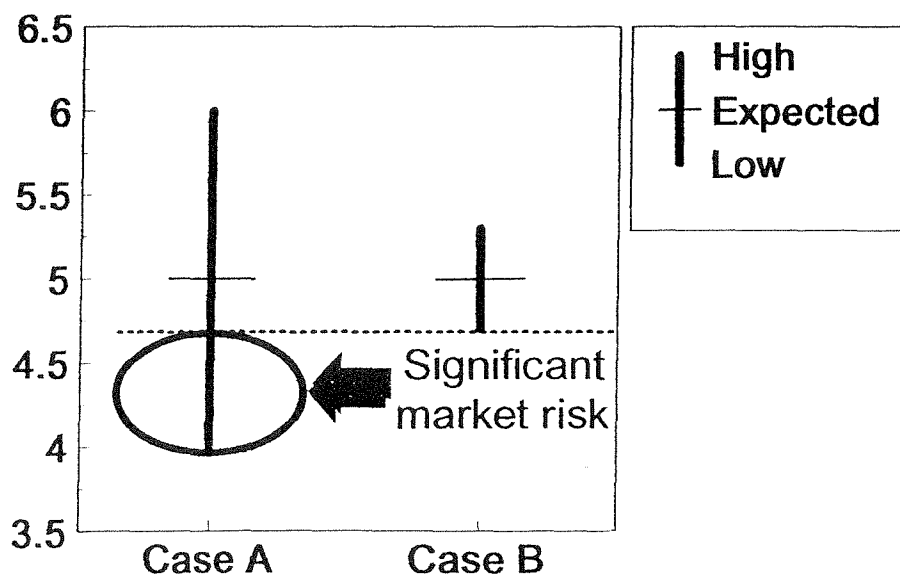


Elements

- Part policy and judgment, part analytics
- Policy and judgment elements are important because utility risk assessment may differ from consumer's perspective

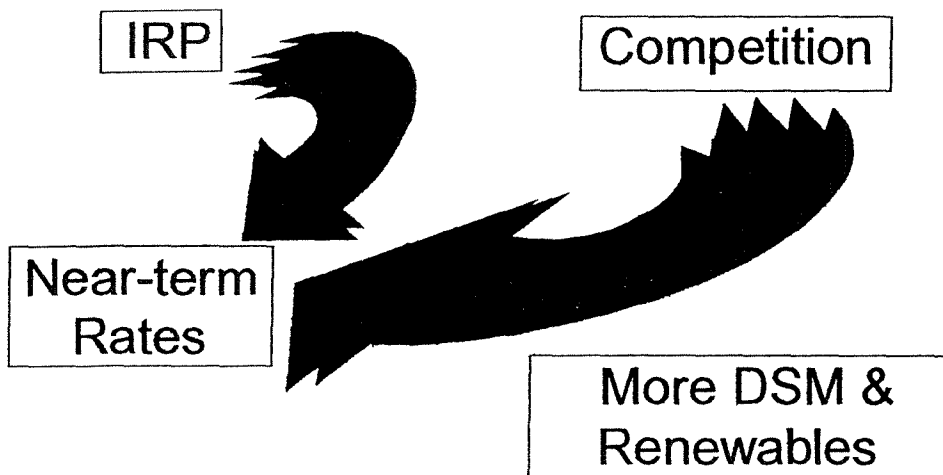


Risk Analysis






IRP & Competition

But ...



Implications for Regulators

- ▶ Diverging utility and customer interest, the greater the need for regulators 
- ▶ But push for competition seeks to lessen regulator involvement 
- ▶ Other option - increased customer input 



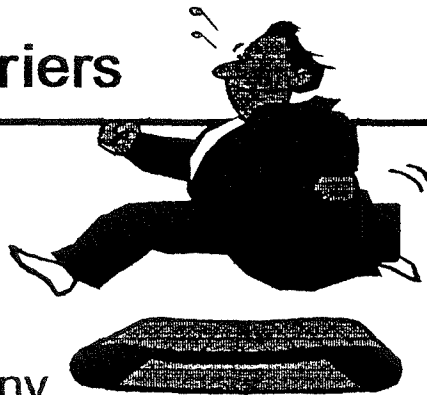
Acquisition Barriers

- ▶ Unreasonable contract and pricing terms
- Apply planning and regulatory principles to acquisition
 - Payment patterns
 - ▶ Front-end loading
 - ▶ Capacity vs. energy payments
 - Security provisions
 - Contract reopeners
 - Termination of purchases



Process Barriers

- ▶ Inefficient process
- ▶ Developers are not regulatory experts
- ▶ There are not that many developers of renewables
- ▶ Commission credibility matters and is determined by consistent application of clearly articulated policies



3.4.2 Panel Members

Colette Gomoto—Public Utilities Commission (PUC)

Blair Swezey—National Renewable Energy Laboratory (NREL)

Roy Uemura—Hawaiian Electric Company (HECO)

Panel Responses

Blair Swezey – NREL

Mr. Swezey, the principle policy advisor for NREL, expanded on David Moskowitz's presentation by detailing two endorsements by the federal government on the need to perform IRP among all the utilities, in all of the states.

- *Energy Policy Act of 1992* - Congress endorsed the concept of IRP by amending PURPA to allow states to consider a standard for electric utilities to employ IRP.

- Renewables are explicitly listed as one of the alternatives that should be evaluated in integrated resource planning.

- A number of risk factors should be included in the deliberation process of the IRP plan, including diversity, reliability, dispatchability and others such as those outlined in Mr. Moskowitz's presentation.

- *Global Climate Change Action Plan* - a more recent federal endorsement that emphasizes the systematic consideration of all relevant options and uncertainties in the development of IRP at the state level.

In considering the value of each resource in the IRP process, Mr. Swezey concluded that the essential paradigm has to be changed from a system in which we look at the direct market cost of each resource, to a system that includes the value of each resource as well. Doing so, must include not only a consideration of direct economic costs of each resource, but a number of various attributes that each resource option brings to the resource mix. These attributes, both positive and negative, include:

- environmental impacts
- economic impacts
- diversity
- modularity
- location
- distributed benefits
- dispatchability

The most important issues to be considered in the evaluation of the IRP are the impact of these attributes on the utility system and how to quantify these attributes in terms that are comparable to the traditional monetary system of direct economic costs. Thus far, no universal method has been implemented for doing this.

In closing, Mr. Swezey said a joint venture with NREL and EPRI have recently initiated an IRP program to improve on existing IRP tools and methods in order to address some of these attributes in the IRP modeling system, particularly where renewables are concerned.

Collette Gomoto – PUC

Ms. Gomoto presented an up-to-date report of what the PUC has been doing in the area of IRP.

In 1990, the PUC instituted a proceeding to require the energy utilities to implement integrated resource planning. The PUC held meetings with utilities, other state agencies and interested parties.

The utilities on all the different islands formulated advisory groups made up of members of the community interested in the IRP process. Using input from these groups, the utilities developed their integrated resource plans and submitted them to the utility. Thus far, three utilities have submitted their plans and hearings have been held for two of them. The PUC is currently grappling with the issues of resource attributes in the IRP process, Ms. Gomoto noted.

The IRPs are intended to be evolving plans, she said. Every three years, the utilities are required to come back to the commission with evaluations of the plans that include proposals to modify the plans.

"We anticipate that the development of new technologies will impact the technology of these plans and will be included in these plans," she said.

"The commission has instituted the IRP program to encourage more efficient and innovative uses of our resources," she said. The PUC will analyze utility plans in the context of state and federal regulations and statutes and the IRP goals, one of which is to provide reliable power at the lowest reasonable costs.

While not one of the utilities has yet identified any wind power generation in their IRPs, in the HECO IRP docket, Makani Uwila has intervened and presented information to the PUC on wind power and other types of renewable resources.

"The commission has found the information very helpful in making its decision on the IRP process. Participation in these dockets is one of the best ways to get information to the commission about the different kind of technologies that are out there and the different ways of evaluating renewable resources," Ms. Gomoto said in closing.

Roy Uemura -HECO

Mr. Uemura, as a representative of the IRP Program for HECO, MECO and HELCO, emphasized that IRP is a broad band, very involved process of looking at different energy resources.

"You have to go through many steps. We look at objectives, provide scenarios and perform the planning functions in which we look at both sides of energy resources, the demand side as well as the supply side," he said.

On the supply side, he explained, HECO investigated all different types of technology for both the general technology and for the fuels available to Hawaii. There were many different options considered for Hawaii, one of which was wind power. Looking at the different options, we then integrated the demand side and supply side attributes of each to come up with a twenty year plan which included a detailed five year plan of action that was costed out.

The IRPs for each of the utilities were then submitted to the PUC for approval:

- HECO - submitted 7/1/93
- MECO - submitted 12/15/93
- HELCO - submitted 10/15/93

The PUC has just recently concluded hearings on the HECO IRP and is in the process of conducting hearings on the HELCO IRP.

The IRP is a dynamic process in that annual evaluations to the PUC are required for each utility. In the annual evaluations, the utility evaluates its forecast to see if assumptions have changed and to determine what the impact is on the five year action plan.

After three years, a major filing of the plan is required to update the technology which will include all new information with regards to wind power, Mr. Uemura said.

Currently, the big question with wind power is, what is the capital cost? he said. What is the O&M cost, what are the current costs, and are there any

royalties? The IRP process is a balancing act to accommodate all the different perspectives:

- The corporate / financial perspective to minimize costs and minimize revenue requirements
- The customer perspective - to provide low, reliable service
- The state perspective - for which the viability of the economy affects pricing of these resources

Mr. Uemura outlined several areas of evaluation in the IRP process:

- Energy efficiency of all the different options [Wind is an available resource but we need to produce data and evaluate that data in order to integrate wind into the supply side of the IRP, he said.]
- Environmental and social impacts
- Current laws and regulations
- Current generation mix [Should we include oil, coal, biomass etc.?)
- Transmission costs
- Externalities [While not yet monetized, externalities are currently being addressed.]

Supply side options are categorized based on the current status of the technology:

- Commercially available, proven technology [Wind is categorized as such]
- Developing technology [i.e. photo voltaic]
- Other future alternatives

In closing, Mr. Uemura emphasized that the IRP process is a big balancing act for the utilities.

"We have to make sure we get enough oil for Hawaii's energy needs and at the same time try to use our natural resources to provide that energy while keeping costs as low as possible," he said.

Question:

When you say that the cost of oil is cheap, aren't you ignoring the externalities and the risks you have asserted add to the cost of oil?

Answer:

David Moskowitz – Regulatory Assistance Project

Yes. Oil is really more expensive if you consider all of its costs and a whole lot cheaper if you consider only its direct costs. Oil is perceived to be cheap. However, the low direct cost of oil has a powerful influence on resource decisions being made by the utilities right now.

Question:

It is difficult to quantify external costs. Is it so difficult that it is meaningless? Is real progress being made to quantify these costs?

Answer:

David Moskowitz – Regulatory Assistance Project

It is important not to lose sight of the importance of the direct cost benefits. Sophisticated analyses of the direct cost benefits had a big impact in Maine where they went from 2% to 35% renewable energy sources in just ten years. Maine does not consider environmental externalities nor the economic benefits in the externality calculation. All of its resource planning is based on direct cost benefits.

In addition to direct costs, it is good to look at consumer rate costs and all of the components that go into utility revenue requirements. That figure has a very wide range.

As far as externalities are concerned, it is difficult to quantify these. At the same time, there is a relatively narrow range of values you can come up with when looking at a broad range of options. Presently, there are nine states that put values on externalities. All of these states have developed figures in the same ballpark.

Another group of states uses a *rule of thumb* consideration such as a 10% premium for non-fossil fuel based facilities.

As for other attributes like diversity, everyone knows that it is worth something extra to have a more diverse system.

In Colorado, a state that did not consider environmental externalities, the Public Service Co. boasted, rightfully so, that it went well beyond the regulations of the Clean Air Act to control polluting emissions from its energy plants. When you calculate how much extra they paid to go beyond the regulations, you come up with externality figures that are in the same order that the environmental groups were pushing and the utilities were opposing.

By presenting the utility with different Plan A and Plan B options, you can illustrate to them the surprisingly small investment required to pay for a more diverse system under different alternative scenarios.

Question:

What role will wind play in the HECO IRP?

Answer:

Roy Uemura –HECO

It is difficult to give a capacity credit for renewables since they are competing with demand side resources and other firm capacity resources.

David Moskovitz –Regulatory Assistance Project

The conclusion that intermittent resources have no capacity value is one of the mistakes that state/utilities make. The best way to think about this issue is in terms of customer loads which are intermittent and not dispatchable by the utility. Water heater demands on a utility system is a good way to illustrate this point (unless you have a direct load control device for your water heater).

Water heaters represent an intermittent demand because they have internal thermostats that determine demand. When that water heater is turned on, the instantaneous demand on the utility system (comparable to the nameplate rating on a wind turbine) is roughly 4 kW. The diversified demand on a typical utility system, or the demand that those water heaters place on the system (taking into account the probable distribution of those water heaters being on and off) is about 1 kW.

Thus, adding electric water heaters increases the requirement for firm capacity on a typical utility system by 1kW per water heater.

If adding intermittent demand increases firm capacity requirements; then adding intermittent supply, when you know something about supply characteristics, also adds a capacity value.

If intermittent supplies did not have capacity value, then intermittent demands would not have capacity costs. And everyone in this industry knows that intermittent demands also have capacity costs because the rate payers are billed every month for these.

What you need to know is the probability of an intermittent supply being available when your system's demand peaks. And every resource that is intermittent in nature will have some capacity value. If you arbitrarily say that

intermittent supply has no capacity value, then you will miss the real value of these intermittent resources to the utility system.

Question:

The IRP process was expected to impact renewables positively. Why haven't renewables fared better in the IRP process?

Answer:

Roy Uemura—HECO

On Oahu, you need land and you need the technology. In the case of wind, we included 50 MW of wind power in our resource assessment. We consider that as a noncapacity benefit although it was an energy savings.

We also looked at cost trade offs and at other technologies. However, we did not have enough information on energy availability, and the costs of energy for renewable resources.

In Hawaii, we are competing for land with other developments, so land is not readily available. In addition, the direct cost of oil went down in January to \$12/barrel.

David Moskowitz, Regulatory Assistance Project

The IRP process in Hawaii is not yet fully refined to give a true picture of benefits of renewables to a utility system.

